Effects of a Teacher-Made Multimedia Program on Teaching Driver Education

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A Case Study Published in

TEACHING Exceptional Children Plus

Volume 2, Issue 5, May 2006

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Abstract

Through a case study, the authors share a story of a high school special education teacher who developed a multimedia program to teach driver education (i.e., speed limits and road signs). The high school students (n=24) had mild disabilities, and were enrolled in a driver education class in a rural high school. The teacher developed the multimedia program using Microsoft PowerPoint. The computer program involved picture and video segments that were captured in the students' familiar environments. As a result of the lessons, the students significantly improved their scores on posttests. In addition, the multimedia lesson was shown to be more effective than a non-multimedia lesson.

Keywords

driver education, mild disabilities, multimedia instruction, educational technology

SUGGESTED CITATION:

Lee, Y., & Keckley, K. (2006). Effects of a teacher-made multimedia program on teaching driver education. *TEACHING Exceptional Children Plus,* 2(5) Article 5. Retrieved [date] from http://escholarship.bc.edu/education/tecplus/vol2/iss5/art5

A smooth transition to adult life is the major goal of high school students with disabilities. To achieve this goal, schools are mandated to provide transition services to students with disabilities who are 16 years old or younger (Turnbull, Turnbull, & Wehmeyer, 2006). Transition services include, but are not limited to: vocation skills instruction, employment options, living arrangement, leisure/ recreation activities, postsecondary education planning, and community participation. One of the most important components of transition services is transportation. Mobility is an essential skill for a high quality, productive life in the 21st century (McGill & Vogtle, 2001). It allows individuals with disabilities to engage in leisure, recreation, and shopping activities. It also provides opportunities to attend doctors' appointments or postsecondary educational training courses without relying on others or on public transportation (Shearin, Roessler, & Schriner, 1999).

Driving skills are critical to obtain and maintain employment. Educators have noted a concern with a low employment rate for individuals with disabilities. According to Fox and Wandry (1998), 40 to 70% of individuals with disabilities are unemployed while 6% of their counterparts are unemployed. These unemployment rates confirm an earlier study by Wagner and Blackorby (1996) that found 37% of young adults with mental retardation to be competitively employed three to five years after graduation. The acquisition of driving skills will reduce the challenges faced by the lack of mobility, and it will increase the likelihood for employment (McGill & Vogtle, 2001).

Despite the significance of driving skills, there have been few studies identified in the literature in which driver education was taught to students with disabilities. Zider and Gold (1981) reported that individuals with moderate mental retardation could learn driving skills through the combination of simulation and driving range training. In their study, the participants learned turning, passing, speed maintenance, and braking. In another study, eight students with learning disabilities at a residential correctional facility successfully learned road signs and traffic laws through direct instruction with transparency projectors in a classroom (Test & Heward, 1983). Among the eight participants, three were able to pass the state exam and received their temporary permit. The latest study was conducted by Bell, Young, Salzberg, and West (1991), who taught driving related skills to two students with disabilities and two students without disabilities using peer tutoring. The students learned how to maneuver "back right," "turn left," and "pass" through traditional paper and pencil tests. As seen in the literature, driver education has been typically delivered through a lecture format in public schools, although best practices in the field recommend instruction in reality (i.e., community-based instruction). With the current educational budget shortfalls faced by most states, it would be impractical to provide hands-on driver education to students in a community. One option is to use technology to bring the real life to a classroom.

Computer-based multimedia instruction involves software with pictures, sounds, animation, and/or video segments. When community-based instruction (CBI) is not feasible because of logistical and fiscal issues (e.g., scheduling, transportation, safety, or budget), multimedia simulation programs can be utilized to meet demands and overcome the limitations (Langone, Clees, Rieber, & Matzko, 2003). Recently, researchers have reported the effectiveness of various multimedia simulation programs to teach daily liv-

ing skills (Ayres & Langone, 2002; Langone, Shade, Clees, & Day, 1999; Mechling & Gast, 2003; Mechling, Gast, & Langone, 2002; Mechling, Pndgen, & Cronin, 2005). These programs provide a cyber environment where students interact with the computer. While these simulation programs are effective and provide a great potential to teach students with disabilities, it is not feasible for teachers to develop the programs because it requires advanced technology skills of authoring software (e.g., Hyperstudio or Authorware). This case study presents a successful story of a high school special education teacher who developed a multimedia program using Microsoft PowerPoint. Microsoft PowerPoint is one of the most commonly used software programs for presentation in classrooms and allows users to embed videos, music, and pictures. The special education teacher with no formal training on technology developed multimedia lessons on road signs and speed limits.

Settings

The study was conducted in a rural high school, which was located in a small migrant agricultural town in a southwestern state. Mike, the special education teacher, had 24 students with mild disabilities enrolled in a Transition Planning and Placement (TPP) class. The students consisted of 17 males and 7 females, who ranged from 17 to 19 years old. A total of 11 students had mild mental retardation, and 13 students were diagnosed with a specific learning disability. 20 of the 24 students were Hispanic, migrant, and English language learners. All students received special education services in a self-contained classroom.

The TPP class was developed through a partnership between the State Department of Rehabilitation (DOR), school districts, and their high school's campus sites, dedicated to providing transition services. Students in the TPP class had the transition goal of competitive or supported employment in their Individualized Education Plans. Both the career center and DOR provided representatives that assisted in the selection and determination of students who were eligible for the class.

In the fall of 2001, representatives from both the DOR and the local school district expressed concerns regarding the limited mobility skills of the TPP graduates. The DOR and the school district jointly requested that students receive the state Department of Motor vehicle (DMV) test preparation instruction in the TPP class. The school district subsequently provided the teacher with the state DMV booklets and copies of all of the DMV exams to use as a curriculum.

Lesson Development

The teacher was aware of the literature on the effectiveness of multimedia, and decided to introduce multimedia lessons on road signs and speed limits to his students. The equipment used for the lessons was a Kodak DX 240 digital camera and a Panasonic PV-DV702D digital video camcorder. The teacher used Apple iMovie to edit video segments and Microsoft PowerPoint to arrange appropriate texts and visuals to address the lesson contents.

The contents of lessons were based on the information from the California DMV Handbook (2002) and the Federal Highway Administration's Standard Highway Signs (FHASHS) (United States Department of Transportation, 2002). The lesson outlines on the topics of speed limits closely followed the DMV handbook, and a list of common warning road signs were compiled using the DMV handbook and FHASHS.

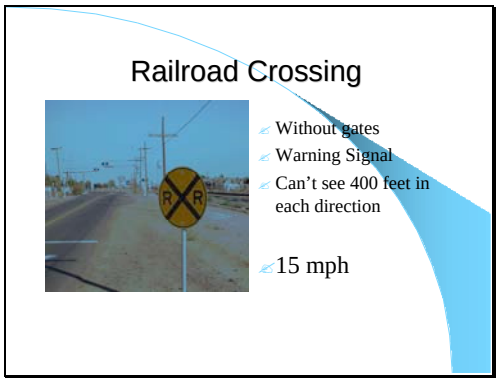
One of the key lesson design components was to continuously examine students' understanding of each concept. For example, each slide on the speed limit lesson was designed to hide the text containing the speed limit. This allowed the teacher to question the students as they viewed the video segment. The correct speed was revealed after the students responded. In addition, slides were created to ask the students to recall information on a previous slide.

Digital pictures and video segments on road signs and speed limits were obtained from the students' community and inserted in the slides. The goal of the road sign video segments was to enhance students' understanding by presenting the actual sign and displaying the road condition listed on the sign. The speed limit video segments presented an example of driving perception at the common speed limits of 15, 25, and 65 mph. The video segments also captured an example of the environment that is governed by the maximum speed law.

The road sign presentation contained a total of 67 Microsoft PowerPoint slides, with 15 video segments and 28 digital pictures (Please see Figure 1 for an example). The speed limit presentation had 53 slides with 5 video segments and 25 digital pictures (Please see Figure 2 for an example).

Figure 1. Slides of Road Sign lessons.

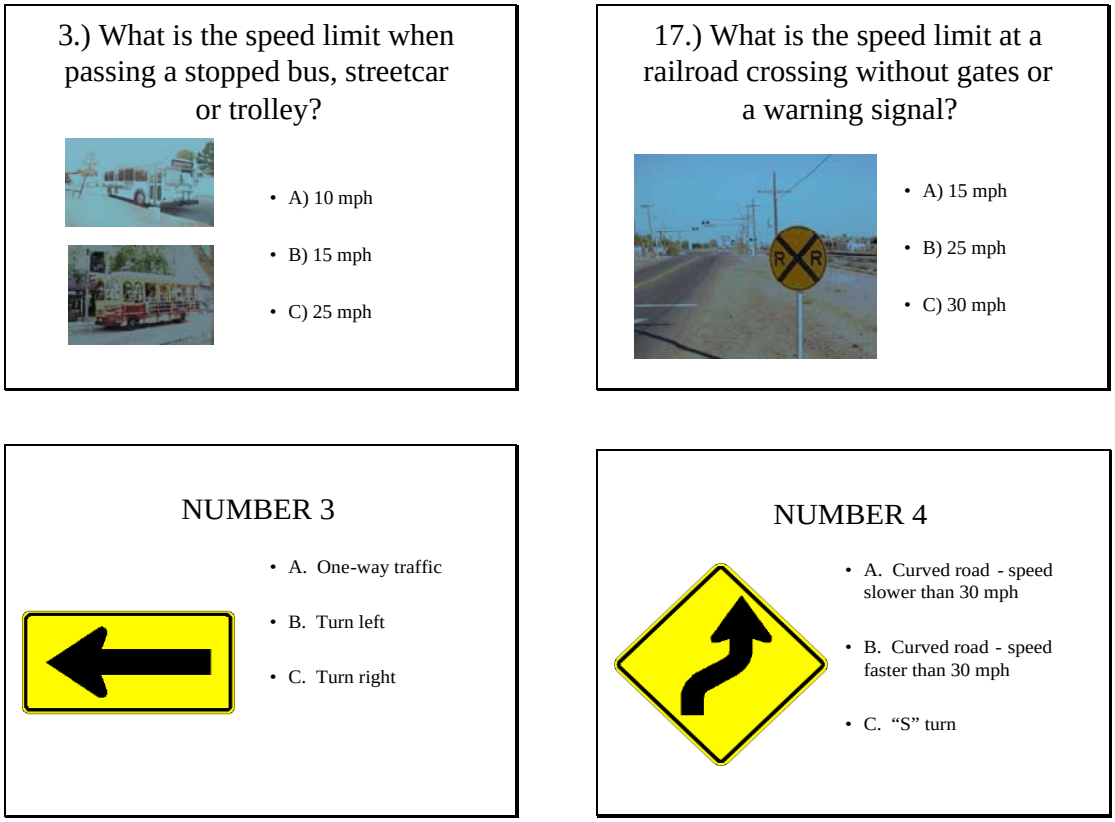
Figure 2. Slides of Speed Limit Lesson



Data Collection Procedure

Mike conducted pre and posttests to examine the effectiveness of multimedia. A pretest on road signs had 29, and a posttest had 26 multiple-choice questions with 3 choices. A pretest and a posttest on speed limits had 19 items each. All tests were created in Microsoft PowerPoint and printed with 6 slides on each page. Please see Figure 3 for the sample test item.

Figure 3. Sample pre and posttest items



Following a pretest, instruction was delivered over nine class periods for road signs and six class periods for speed limit lessons, one period per instructional day. Each class period was 55 minutes long and involved whole-class direct instruction. After the completion of teacher directed lessons, the students spent one period working on a computer independently. During the independent period, they used a desktop computer to navigate the PowerPoint presentation at their own pace. Posttests were administered immediately following the independent lessons. When the lessons and testing had been completed, the teacher placed the PowerPoint presentations on the school computer server, allowing the students' access to the lessons from any computer on campus.

Non-Multimedia Instruction

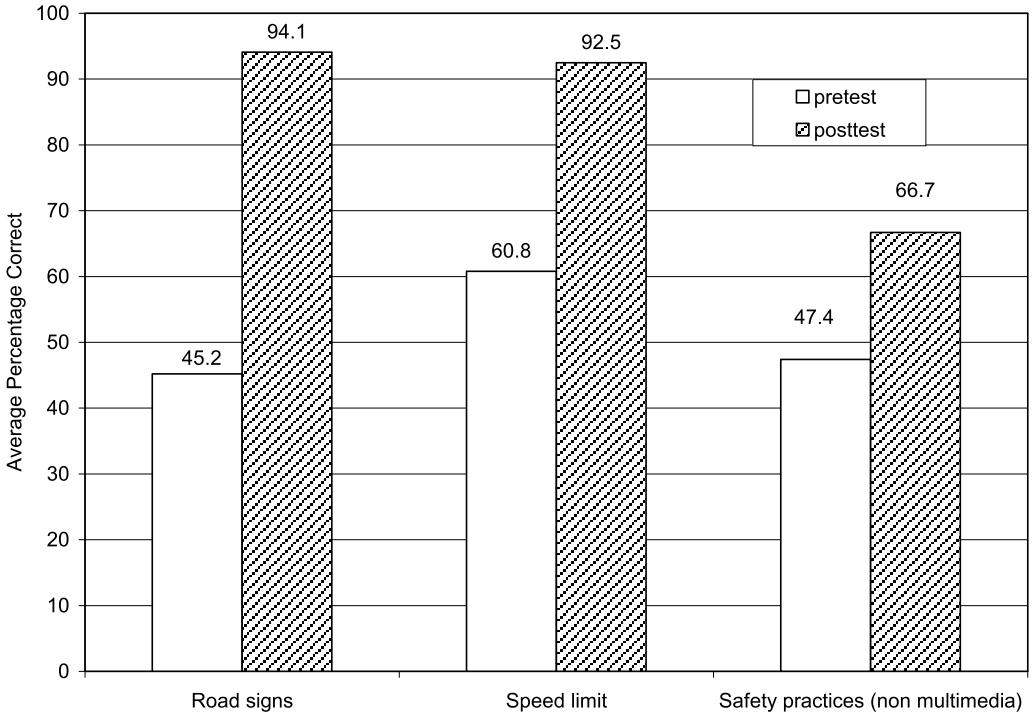
The non-multimedia instruction of safe driving practices was delivered to the same group of students prior to the introduction of multimedia instruction. The lesson was directed by the teacher with teacher-created worksheets that closely followed the

text of the DMV handbook. During each lesson, the students learned the topic in a drill-and-practice format. After the teacher-directed lessons, a game was introduced to review the content of the lesson. During the game, they were divided into two groups, and each group took turns answering questions to earn points. A pretest was conducted prior to the introduction of the non-multimedia lesson, and a posttest was administered at the end of the tenth day of instruction. Both the pre and posttest consisted of 25 questions.

Results

The students performed at an average of 45.2% correct responses with a range of 24 to 72% correct on the pretest of road sign lessons. Their responses improved to an average of 94.1% correct responses with a range of 77 to 100% on the posttests. The speed limit pretest was administered in the same manner as the road sign pretest. The speed limit pretest results yielded an average score of 60.8% correct responses, ranging from 32 to 68%. The average score improved to 92.5% correct after the multimedia lesson, ranging from 79 to 100%. During the non-multimedia lesson, students improved from an average of 47.4% on a pretest to 66.7% correct on a posttest (See figure 4). All improvements for the multimedia group were significant at the .05 level of significance while the non-multimedia lesson was not significant.

Figure 4. Results of Pre and Posttests



Discussion

This case study showed that the multimedia lessons were effective in teaching road signs and speed limits and produced higher levels of performance than non-multimedia instruction. While the students also improved after the non-multimedia instruction, the scores were not satisfactory and below a passing score (83.3%) of the state DMV exam. Anecdotal data also indicated the increased level of the participants' interest in the multimedia lesson. The video segments bring the real life into a classroom and increase the participants' understanding of the situation. While the students were initially distracted by the novelty of the video segments, the distractibility was attenuated as the lesson went on. It is also noteworthy that the multimedia program could be made by a teacher who had minimum formal training on technology or experience on any authoring software (e.g., Authorware or Hyperstudio). Thus, given advances in digital media technology, teachers should be encouraged to create multimedia programs for their students.

An advantage of a multimedia lesson is in its adaptability and flexibility to various instructional settings (Mechling, 2005; Norman, Collins, & Schuster, 2001). In the current study, a lesson was introduced to a whole group, and then saved in an individual computer for an independent review. The multimedia program can also be delivered through peer tutoring (Bell et al., 1991), or it can be sent to the student's home. Furthermore, it is a new way to provide simulations of real life skills in a classroom (Ayres & Langone, 2002). Video segments allow students to be immersed in natural environments with rich exemplars, and they can be used to reduce safety issues, transportation, time, and supervision in community-based instruction (CBI). In particular, the video segments in this study were collected from the students' neighborhood, which made the lessons meaningful for them.

This case study contributes to the field of special education by providing a viable teaching strategy for students with mild disabilities. It showed that multimedia lessons were an effective method to teach driver education and to complement CBI. The results should be carefully interpreted because this study did not compare multimedia with paper-and-pencil lessons on the same content. It is possible that the results are caused by repeated exposure to the content rather than the effects of multimedia. It is suggested that teachers evaluate the effects of multimedia and paper-and-pencil lessons on the same content. It is also advised to collect information on passing rates of the actual driver test to examine the generalization of the acquired skills.

Future researchers should examine the effectiveness of the combined instruction (i.e., simulation and real life training) on driver education because the literature supports the combination of simulation and in-vivo training (Branham, Collins, Schuster, & Kleinert, 1999; Wissick, Gardner, & Langone, 1999). Another limitation is the relatively small sample size in the study. Further research with a larger sample size and a variety of students should be conducted to increase the validity of the findings. Additionally, the multimedia lessons in the current investigation allowed for minimal computer-user interaction and were presented in a linear format. The multimedia instruction with an interactive component is suggested and should be developed and evaluated for its effectiveness.

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